DURBAN CHAMBER OF COMMERCE AND INDUSTRY
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DRAFT INTEGRATED RESOURCE PLAN FOR ELECTRICITY (2010-2030), UPDATE REPORT 2013

A COMMENTARY

1. INTRODUCTION

The landscape of South Africa's energy resource environment has undergone some rapid changes in recent years. Previously, South Africa was fortunate to exploit abundant coal resources for the purpose of generating relatively cheap electricity. The private sector, particularly large industrial manufacturers, had taken advantage of a cheap and reliable electricity source, to produce internationally competitive goods. This is no longer the case, unfortunately, owing to three main factors:

- A severely constrained national supply of electricity due to insufficient planning and maintenance of large coal-fired power plants;
- Significant year-on-year increases in electricity prices; and
- National and international governments' increasing awareness of the detrimental effect of greenhouse gas (GHG) emissions on the environment, and the associated commitment to reduce these emissions.

Eskom is the largest producer of carbon emissions in South Africa, producing 228 million tons in 2012[1]. Using this level of annual emissions as a benchmark, the proposed carbon tax for which Eskom will be liable, is estimated to be R 10,9 billion in the first year of full implementation. It is assumed that under the cost-recovery rules of the prevailing electricity pricing policy, Eskom will recover the cost of the carbon tax via an increase in electricity

[1] Please see http://www.iol.co.za/business/news/third-coal-power-station-on-cards-1.1567578

tariffs. The implication of further electricity tariff hikes will be detrimental to the private sector, which already has to contend with an unreliable and expensive electricity supply. In order to prevent the price of electricity from inhibiting business operations, the Chamber suggests that there must be a fundamental shift in the way in which South Africa manages its energy security. The Chamber suggests two overall strategies which will simultaneously improve energy security, create jobs and foster sustainable development. These strategies are

- a greater emphasis on energy efficiency improvements (in businesses of all sizes); and
- a concerted effort to nurture the local renewable energy technology sector. These strategies are discussed in greater detail in the following sections.

2. ENERGY EFFICIENCY

2.1. Department of Energy's Energy Efficiency Strategy 2005

Internationally, industrial operations use 40% of worldwide energy resources, which contribute roughly 37% of global GHG emissions[2]. Also, the international production of energy-intensive industrial goods has grown significantly and is expected to maintain this growth trajectory as both population and income per capita increase. Worrel (2008) finds that since 1970, the production of ammonia increased by 353%; cement by 336%; aluminium by 252%; paper by 190%; and steel by 95%. Worrel (2008) goes on to state that the energy intensity of the average industrial process is at least 50% higher than the theoretical minimum. This, coupled with our government's commitment to reducing GHG emissions, provides a significant opportunity for a reduction in energy use and its associated carbon emissions.

While there are a variety of technologies available, which have the potential for reducing energy use, in the short-to-medium term, energy efficiency is the most useful tool to minimise South Africa's reliance on coal-generated electricity.

In 2005, the Department of Energy released its Energy Efficiency Strategy which sought to set a national target of a 12% improvement in South Africa's energy efficiency by 2015. Not only will this improvement reduce GHG emissions, but the production of a given

[2] Price et al (2006)

quantity of output which utilises less electricity will boost firm's profit margins and reduce their carbon tax liabilities. The table below outlines the associated benefits of energy efficiency:

TABLE 1: Benefits associated with energy efficiency

Type of benefit	Benefit
SOCIAL	Improved health of the nation Energy efficiency interventions reduce emissions of harmful atmospheric substances which have an adverse effect on health, especially as a cause of respiratory agents.
	Job creation The spin-off effects of energy efficiency implementation will create jobs. Improvements in commercial economic performance will lead to employment opportunities.
	Energy poverty alleviation Energy efficient homes not only improve occupant health and well-being, but also enable adequate provision of energy services to the community at an affordable cost.
ENVIRONMENTAL	Reducing environmental pollution Energy efficiency will reduce local environmental impacts of its production and use.
	Reduce carbon dioxide emissions Energy efficiency is one of the most cost-effective methods of reducing GHG emissions and thereby combatting climate change.
ECONOMIC	Improve industrial competitiveness One of the most cost-effective ways to maximise commercial profitability is the adoption of appropriate energy efficiency measures. On the macro-scale, this will improve South Africa's export performance and improve the value that the economy derives from indigenous energy reserves.
	Enhance energy security Energy conservation will reduce the necessary volume of imported primary energy sources (crude oil in particular). This will enhance the robustness of South Africa's energy security and will increase the country's resilience against external energy supply disruptions and price fluctuations.
	Reduce the necessity for additional power generation capacity Energy efficiency is integral to Eskom's demand-side management programme, which is intended to reduce the level of load growth by a cumulative value of 4255 MW by 2025, equivalent to a saving of a six unit coal-fired power station.

Source: Department of Energy (2005:4-5)

Considering the significant benefits, particularly the economic benefits of energy efficiency interventions, the Durban Chamber fully supports these interventions and encourages the Department of Energy to drive these interventions. **As businesses have different characteristics in terms of their size and electricity requirements, the Chamber suggests that the Department of Energy and Eskom look towards installing different energy efficiency interventions targeted at different types of businesses**. Most notably, a specific energy efficiency intervention must be developed and implemented for large industrial users of electricity and another for small businesses.

2.2. Large industrial electricity users

In a growing trend many governments have sought to launch voluntary industrial energy efficiency programmes, which may be defined as a formal agreement with contracts between government and industry, which include negotiated targets and commitments on the part of all participating parties. In South Africa, these voluntary agreements are not particularly popular, owing to the perceived tedious commitments (mostly administrative in nature), expected on the part of the private sector. However, internationally these voluntary agreements have been met with mixed results. UNFCC (2002) finds the more successful agreements to be those which include explicit targets and exert pressure on industry to meet these targets. These successful programmes are typically those which have either an implicit threat of future taxes or regulations or those that work in conjunction with an energy or carbon tax, such as the Dutch Long-Term Agreement, the Danish Agreement on Industrial Energy Efficiency and the UK Climate Change Agreements. These programmes have proven to be cost effective and yield significant energy savings. In addition to the reduced demand for electricity, these agreements have a variety of useful externalities or spin-offs, which include: changes in attitudes towards electricity use; a reduction in barriers to innovation and technology adoption; creating market transformations; promoting dynamic interactions between different actors involved in technology research and development, deployment and market development; and facilitating co-operative arrangements which provide learning mechanisms within an industry.

While the Chamber fully supports interventions such as the NBI's Private Sector Energy Efficiency programme and the CSIR's National Cleaner Production Centre, these interventions are unsustainable due to their ad hoc nature and heavy reliance on donor-funding. **The Chamber suggests that the Department of Energy must look to exploit a more sustainable funding pool for these programmes, to ensure greater energy security in future. The ring-fencing of the revenue from a Carbon Tax would facilitate such provision.**

The private sector encounters several barriers to energy efficiency:

- Heterogeneity, i.e. an intervention which my be cost-effective for the average firm, may not be cost-effective for all firms. Firms which are characterised by a highly specialised production process, often encounter this barrier.

- Lack of access to capital.

- Perceived risk associated with the intervention.

- Information which is imperfect and relates to insufficient information about the energy performance of different technologies and its potential savings, leads to sub-optimal decisions based on uncertain information, leading to under-investment in energy efficiency.

Thollander and Ottosson (2007), in reviewing the empirical literature, find that the five most significant barriers to firms who wish to enact energy efficiency interventions are: technical risks, such as the risk of production disruptions; costs/hassle/inconvenience associated with production disruptions; heterogeneity; a lack of time or other priorities; and a lack of access to capital.

The Chamber suggests the development of a multi-disciplinary task team to interrogate all of these barriers and provide thorough recommendations to mitigate them. Universities and development finance institutions have a significant role to play in this process, as each of these organisations have specific expertise which they can leverage to the benefit of the private sector.

An extremely successful industry-wide energy efficiency programme is that of the European chemicals industry[3]. This industry has made use of process intensification and integration; novel energy-saving processes; and the installation of combined heat and power. Over the period 1995 to 2008, the industry decreased its energy consumption per unit of production by 41%. The chemicals sector attributes its successes to a strong focus on research and development, as well as a support for innovation. The Chamber believes that our national Department of Science and Technology can fulfill this role for South Africa.

[3] Please see http://www.cefic.org/Policy-Centre/Energy/Energy-Efficiency/

It is also important to remember that energy efficiency interventions also include heat recovery and re-use of industrial waste heat. 'Heat recovery' can be defined as[4] "*the collective term for the practice of re-using the thermal energy generation during a manufacturing process and which is frequently emitted into the environment as unused waste heat*". Through the establishment of linking procedures in an intelligent manner, a business owner can significantly reduce the amount of primary energy utilised in their operations. German companies are dedicated to energy efficiency interventions primarily as a result of their government's offer of state sponsored programmes, such as the European Recovery Programme. German businesses also have the option of acquiring assistance from financial institutions and leasing companies. The support of the German government has created a domestic market for industrial heat recovery technologies. **The Chamber suggests that South Africa's government structures emulate the behaviour of Germany's government**.

A successful international example of a heat recovery intervention is that of Ecofys[5]. Together with Element Energy and Imperial College London, Ecofys developed a programme to quantify the potential for recovery and re-use of industrial waste heat. It involves databases describing 'archetypical' characteristics of industrial waste heat production and heat sinks, and a database on heat recovery technology. Overall 48 TWh per year of industrial waste heat sources were identified, about 16% of the industrial energy demand. The technical potential of the source-sink combinations which together deliver the highest CO_2 saving, was identified to be 11TWh/year (2,9Mt CO_2/year). They also identified a commercial potential of 6 TWh per year with a payback period of a maximum of two years. From Ecofys' study, **the Chamber concludes that there is technical and economic potential for a 'de-carbonising' of industrial energy demand by recovery and re-use of industrial waste heat**.

[4] Federal Ministry of Economics and Technology (2008:16).

[5] Please see http://www.ecofys.com/en/project/recovery-and-re-use-of-industrial-waste-heat/

2.3. Small businesses and energy efficiency

Small businesses typically have very different energy needs to those of large industrial users. Small businesses are attracted to the idea of energy efficient operations as this will boost their firm's profitability, thus there is an economic incentive to induce firms to adopt energy efficient technologies and practices. The attitudes of the owner and/or managers of the small business are likely to affect the firm's attitude towards energy efficiency and environmental conservation, as the decision-making ability rests with one or a few individuals. UNIDO (2011) conducted a survey of 87 small Indian firms with regard to their approach and attitudes towards energy efficiency. A large number of these firms, which are in the iron and steel; textiles and food processing sectors, utilise older technologies which are not energy efficient. Thus these firms have a significantly negative impact on the environment.

In UNIDO's survey, 100% of the SMMEs reported that they were aware of the increased profitability associated with adopting energy efficient technologies; however, only 37% of these SMMEs went on to adopt these technologies. The SMMEs cited a lack of capital as the primary barrier to the adoption of these technologies. The SMMEs which did go on to adopt these technologies had very differing views regarding the payback period associated with the technologies: 67% of them expected a payback period of six months to three years, while 21% expected a payback period of more than three years. The variety in the perceived payback period illustrates SMMEs' demands for different types of energy efficiency technologies, ranging from very simplistic technologies, with short payback periods to more advanced solutions, which require a significantly longer payback period. Thus, **the Chamber recommends that SMMEs have access to support systems which assist them in making optimal technology choices to boost energy efficiency in their businesses**. This support may be provided by the Department of Energy, or local municipalities. Without this support, it is unlikely that SMMEs will seek, of their own accord, to source the requisite knowledge and expertise to arrive at the vital decision to adopt energy efficiency technologies.

There appears to be a perception amongst SMMEs that initial capital costs required to adopt energy efficiency technologies are considerable. This is often an inhibitory factor for firms whose capital base is inadequate to undertake such an investment. In the UNIDO survey, 40% of the SMMEs stated that even though they are aware of the long-term profitability

gains associated with the switch to energy efficient technologies, they did not have the capital or access to the capital to facilitate the switch. In the survey, while 33% of the firms which utilised consultants to monitor their energy usage, did not implement the recommendations of the consultants. Again, a lack of finance was the main barrier to the adoption of energy efficiency technologies. In fact, the firms in survey were asked to rank their greatest obstacles to the adoption of energy efficiency technologies, and 69% of the firms cited a lack of finance as the primary barrier. **Therefore the Chamber suggests that the Department of Trade and Industry and development finance institutions offer specific incentives (in the form of grants or loans) for small businesses which seek to adopt energy efficiency technologies in their businesses**. In addition to bolstering adoption of these technologies, these incentives will encourage the development of local manufacturers and service providers of energy efficiency technologies.

3. RENEWABLE ENERGY

In the Chamber's comment on the Draft 2012 Integrated Energy Planning Report (IEPR), the Chamber strongly motivated for the development of a local renewable energy technology sector and the green economy. In the IEPR comment, the Chamber illustrated the significant job creation potential of the green economy. The importance of this suggestion warrants repetition.

3.1. Job creation potential

The UNEP Green Economy Report[6] finds that a green economy can create significant employment opportunities. The Report identifies the energy sector as one of the largest four areas to play a sizable role on the development of the green economy. The Report finds that by 2050, the greater utilisation of renewable energy technologies, coupled with investments in energy efficiency, could bolster employment creation by as much as 20 percent internationally.

For fuel-free renewable energy technologies, the greatest number of jobs will be created in the installation, manufacturing and administration phase, while for fuel-based technologies (such as biomass), crop production and the distribution of the biomass account for the largest share. Due to a stream-lining of production methods, labour productivity has the

[6] Gueye (2012)

potential to increase over time. As renewable energy technologies are more labour-intensive than fossil fuel technologies (solar photovoltaic has the highest ratio of new jobs created per unit of energy delivered over a facility's lifetime[7]), the exploitation of renewable energy technologies is a viable option for our country's economic development. While authors may argue about the quantitative extent of employment effects, they do agree that the deployment of renewable energy technologies is associated with net job creation. However, the propensity for job creation is dependent on: the success of the deployment; local industrial and labour policy; the ability to exploit export markets; and the multiplier effects on the rest of the economy. Much of the literature suggests that job-creation strategies must be formulated with reference to a country's specific characteristics and circumstances. **The Chamber believes that the employment benefits from the deployment of renewable energy technologies are more likely to be maximised where there are focused labour market interventions which support the development of industry-appropriate skills**. Further jobs may be created through the establishment of a local renewable energy technology manufacturing industry.

TABLE 2: Estimated job creation by different forms of energy generation

Energy technology	Construction, manufacture and installation jobs (per MW) in 2009	Construction, manufacture and installation jobs (per MW) in 2030	Operation, maintenance and fuel processing jobs (per MW)
Existing coal[8]	0	0	0,75
Supercritical coal[9]	2,5	2,3	0,65
Nuclear[10]	1,8	1,8	0,68
Biomass[11]	8,5	8,5	14
Landfill gas[12]	3,8	3,8	2,3
Wind[13]	15	10,4	1
Solar photovoltaic[14]	30	9,1	0,4

[7] IRENA (2011)

[8] Department of Energy (2009) and Eskom (2009)

[9] Agama Energy (2003) and Eskom (2009)

[10] Rutovitz and Atherton (2009)

[11] Working for Energy (2009)

[12] Agama Energy (2003)

[13] Agama Energy (2003)

[14] Agama Energy (2003)

Table 2, above, illustrates a comparison of the current types of electricity generation available in South Africa. In the construction, manufacture and installation category for 2009, the solar photovoltaic sector produced the most new jobs per MW, while by 2030 the wind sector will create the most new jobs per MW. In terms of sustainable, meaningful employment (employment in operation, maintenance and fuel processing), the biomass sector creates the most jobs per MW.

This analysis illustrates that renewable energy technologies out-perform coal and nuclear energy generation in terms of job creation, in both job categories. Thus, **in-line with the overarching economic development objectives of South Africa, where job creation is prioritised, the Chamber posits that the green economy holds substantial promise which cannot be ignored**.

3.2. Local content requirements

In order to nurture a local renewable energy technology sector, the Chamber supports the installation of local content requirements[15] in this sector, as the localisation of manufacturing is imperative to a move towards a renewable energy sector which is not reliant on foreign imports. The local content requirements will have three primary benefits, namely: local job creation; the export of domestically manufactured renewable energy technologies; and cost savings. There is also the propensity for the accumulation of technological capabilities which are vital to the development of long-term competitiveness and the adaptation of the technology to local needs. Also, energy security and the promise of green job creation are strong political motives for the development of local manufacturing capabilities. The local content requirements can also guarantee sales for local infant industries whilst local manufacturers develop the capabilities to compete with international manufacturers. **The Chamber stresses that the protective space afforded by the local content requirements must be temporary in nature**, i.e. they must be phased-out once the protected infant industry has become internationally competitive. This will ensure that there will be no long-term distortions in the international renewable energy market.

[15] The World Trade Organisation defines a "local content requirement" as "*a requirement that the investor purchase a certain amount of local materials for incorporation in the investor's product*".

3.3. Independent power producers

Independent power producers [16] are essential to ensuring South Africa's future energy security. Currently, many private sector organisations, which seek to take advantage of Eskom's Independent Power Producer Programme, are discouraged by the associated legislative and bureaucratic constraints. By removing these constraints, large scale independent power producer projects would create significant job opportunities; increase national production of electricity; and attract foreign investors. Through the provision of reliable and affordable electricity, independent power producers have a role to play in laying the foundation for an internationally competitive industrial sector in South Africa.

The Chamber cites the example of Anglo Platinum as a motivation for the support of independent power producers. Anglo Platinum has signed a 15 year, $ 12 million independent power producer project to help recover waste heat energy from its platinum converting process at its Waterval smelter[17]. The project will harvest 20MW of thermal energy and return about 3,7 MW of electrical energy into the grid, while the cost of energy saved is estimated to be worth $1,5 million. The carbon emissions saving is estimated to be 19 000 tons of CO_2 per year, based on the current carbon tax, this could save Anglo Platinum $ 3 million per year. The project funding was obtained from Investec Bank while the Department of Trade and Industry provided development finance. This project illustrates how alternative financing models can be used effectively in an IPP project. . **The Chamber suggests that development finance institutions, such as those which assisted Anglo Platinum earmark further funds to roll-out of a large-scale, administratively-light independent power producer assistance programme**.

[16] Defined as "*an entity, which is not a public electric utility, but which owns and or operates facilities to generate electric power for sale to a utility, central government buyer and end users*".

[17] Please see http://www.esi-africa.com/ipp-project-for-waste-heat-recovery-at-sa-platinum-smelter/

4. CONCLUSION

The Chamber finds the plan as set out very acceptable as a way forward for the next sixteen years. Attention has been drawn, particularly, however, to the need for greater incentives for the development of energy efficiencies in all business sectors, including small and medium-sized businesses. The achievement of desired results should not be expected of large industrial entities alone.

The Chamber has also highlighted its belief that more attention needs to be given to renewable sources of energy and a greater focus on the growth of a green economy, particularly considering the potential for job creation, as shown above.

The current adverse circumstances might have been avoided to some significant degree had there been greater efficiencies in the generation and distribution of electricity in the past. The deficiencies have included inadequate attention to maintenance (within the national and municipal grids) and indifferent planning. The Chamber believes that the recipients of electricity alone cannot be relied upon to practice all the energy efficiencies required.

The Chamber notes there is no reference in the plan to generation by nuclear power. This is related to the understanding, perhaps, that any nuclear development would not be brought to fruition during the period for which the plan has been drawn. The merits of nuclear energy require more urgent consideration and attention.

A.J. LAYMAN
Chief Executive Officer 7 February 2014

REFERENCES

Agama Energy. 2003. *Employment Potential of Renewable Energy in South Africa*. Cape Town: Agama Energy.

Department of Energy (**DoE**). 2009. *Digest of South African Energy Statistics 2009/1*. Pretoria: Department of Energy.

Eskom. 2009. *Annual Report, 2009*. Johannesburg: Eskom.

Federal Ministry of Economics and Technology. 2008. *Energy efficiency-Made in Germany, energy efficiency in industry and building services technology*. Available online: http://www.efficiency-from-germany.info/EIE/Navigation/EN/root.html

Gueye, M.K. 2012. Presentation: *Fostering Green Jobs and Decent Work Creation in a Green Economy*. The Green Jobs Programme of the International Labour Organisation. Available online: http://www.unep.org/greeneconomy/Portals/88/documents/Information%20Materials/Webinars/ILO%20Green%20Jobs%20Decent%20Work.pdf

IRENA. 2011. IRENA Working Paper- *Renewable Energy Jobs: Status, Prospects and Policies*. Available online: http://www.irena.org/DocumentDownloads/Publications/RenewableEnergyJobs.pdf

Price, L., S. de la Rue du Can, J. Sinton, E. Worrel, N. Zhou and J. Sathaye. 2006. *Sectoral trends in global energy use and greenhouse gas emissions*. Berkley, CA: LBNL-56144, Lawrence Berkley National Laboratory.

Rutovitz, J. and Atherton, A. 2009. *Energy Sector Jobs to 2030: A Global Analysis*. Sydney: Greenpeace International, by Institute for Sustainable Futures, University of Technology.

Thollander, P. and M. Ottosson. 2007. "An energy efficient Swedish pulp and paper industry-exploring barriers to and driving forces for cost-effective energy efficiency investments. *Energy Efficiency*, (1), 1, pp. 21-34.

UNFCCC. 2002. *Good practices. Policies and measures among parties included in Annex I to the Convention in their Third Communications- Report by the Secretariat*. UN Framework Convention on Climate Change.

UNIDO. 2011. *Approach to energy efficiency among micro, small and medium enterprises in India: Results of a field survey*. Working Paper 08/2011. United Nations Industrial Development Organisation.

Working for Energy: *MTEF Submission*, 2009-2012. Pretoria: Department of Energy.

Worrell, E., L. Bernstein, J. Roy, L. Price and J. Harnisch. 2008. *Industrial energy efficiency and climate change mitigation.* Available online: http://link.springer.com/article/10.1007/s12053-008-9032-8/fulltext.html